Docusign Envelope ID: 50FB72C1-68BB-8F96-839B-BC1AB68A644E

# COMOSAR E-Field Probe Calibration Report

Ref : ACR.78.6.26.PAR.B

Cancel and replace the report ACR.78.6.26.PAR.A

## WALTEK TESTING GROUP (SHENZHEN) CO., LTD

**1/F., ROOM 101, BUILDING 1, HONGWEI INDUSTRIAL PARK, LIUXIAN 2ND ROAD, BLOCK 70 BAO'AN DISTRICT, SHENZHEN, GUANGDONG, 518101 CHINA**

## MVG COMOSAR DOSIMETRIC E-FIELD PROBE

**SERIAL NO.: 0725-EPGO-446**

**Calibrated at MVG**

**13 Rue du Zephyr**

**91140 Villejust - FRANCE**

**Calibration date: 03/03/2026**

ACCREDITED
CERT #2246.03

Scope available on :https://a2la.org/

*Summary:*

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed at MVG, using the CALIPROBE test bench, for use with a MVG COMOSAR system only. The test results covered by accreditation are traceable to the International System of Units (SI).

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| | *Name* | *Function* | *Date* | *Signature* |
|---|---|---|---|---|
| *Prepared by :* | Pedro Ruiz | Technical Manager | 3/18/2026 | |
| *Checked & approved by:* | Pedro Ruiz | Technical Manager | 3/18/2026 | |
| *Authorized by:* | Christophe Barrot | Quality Manager | 2026 April 21 | Signed by: Christophe BARROT 7587FED2BCF046E... |

| | *Customer Name* |
|---|---|
| *Distribution :* | WALTEK TESTING GROUP (SHENZHEN) CO., LTD |

| *Issue* | *Name* | *Date* | *Modifications* |
|---|---|---|---|
| A | Pedro Ruiz | 3/18/2026 | Initial release |
| B | Pedro Ruiz | 04/10/2026 | Update customer address |
| | | | |
| | | | |



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# 1 DEVICE UNDER TEST

| Device Under Test | |
|---|---|
| Device Type | COMOSAR DOSIMETRIC E FIELD PROBE |
| Manufacturer | MVG |
| Model | SSE2 |
| Serial Number | 0725-EPGO-446 |
| Product Condition (new / used) | Used |
| Frequency Range of Probe | 0.15 GHz-7.5GHz |
| Resistance of Three Dipoles at Connector | Dipole 1: R1=0.248 MΩ<br>Dipole 2: R2=0.216 MΩ<br>Dipole 3: R3=0.231 MΩ |

# 2 PRODUCT DESCRIPTION

## 2.1 GENERAL INFORMATION

MVG's COMOSAR E field Probes are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards.

**Figure 1** – *MVG COMOSAR Dosimetric E field Probe*

| | |
|---|---|
| Probe Length | 330 mm |
| Length of Individual Dipoles | 2 mm |
| Maximum external diameter | 8 mm |
| Probe Tip External Diameter | 2.5 mm |
| Distance between dipoles / probe extremity | 1 mm |

# 3 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide recommended practices for the probe calibrations, including the performance characteristics of interest and methods by which to assess their effect. All calibrations / measurements performed meet the fore-mentioned standards.

## 3.1 SENSITIVITY

The sensitivity factors of the three dipoles were determined using a two step calibration method (air and tissue simulating liquid) using waveguides as outlined in the standards for frequency range 600-7500MHz and using the calorimeter cell method (transfer method) as outlined in the standards for frequency 150-450 MHz.

## 3.2 LINEARITY

The evaluation of the linearity was done in free space using the waveguide, performing a power sweep to cover the SAR range 0.01W/kg to 100W/kg.



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### 3.3 ISOTROPY

The axial isotropy was evaluated by exposing the probe to a reference wave from a standard dipole with the dipole mounted under the flat phantom in the test configuration suggested for system validations and checks. The probe was rotated along its main axis from 0 to 360 degrees in 15-degree steps. The hemispherical isotropy is determined by inserting the probe in a thin plastic box filled with tissue-equivalent liquid, with the plastic box illuminated with the fields from a half wave dipole. The dipole is rotated about its axis (0°–180°) in 15° increments. At each step the probe is rotated about its axis (0°–360°).

### 3.4 BOUNDARY EFFECT

The boundary effect is defined as the deviation between the SAR measured data and the expected exponential decay in the liquid when the probe is oriented normal to the interface. To evaluate this effect, the liquid filled flat phantom is exposed to fields from either a reference dipole or waveguide. With the probe normal to the phantom surface, the peak spatial average SAR is measured and compared to the analytical value at the surface.

The boundary effect uncertainty can be estimated according to the following uncertainty approximation formula based on linear and exponential extrapolations between the surface and $d_{be}$ + $d_{step}$ along lines that are approximately normal to the surface:

$$\mathrm{SAR}_{\mathrm{uncertainty}}[\%] = \Delta\mathrm{SAR}_{be}\,\frac{(d_{be}+d_{step})^2}{2d_{step}}\,\frac{\left(e^{-d_{be}/(\delta/2)}\right)}{\delta/2} \quad \text{for } (d_{be}+d_{step}) < 10\text{ mm}$$

where

| | |
|---|---|
| $\mathrm{SAR}_{\mathrm{uncertainty}}$ | is the uncertainty in percent of the probe boundary effect |
| $d_{be}$ | is the distance between the surface and the closest *zoom-scan* measurement point, in millimetre |
| $\Delta_{step}$ | is the separation distance between the first and second measurement points that are closest to the phantom surface, in millimetre, assuming the boundary effect at the second location is negligible |
| $\delta$ | is the minimum penetration depth in millimetres of the head tissue-equivalent liquids defined in this standard, i.e., $\delta \approx 14$ mm at 3 GHz; |
| $\Delta\mathrm{SAR}_{be}$ | in percent of SAR is the deviation between the measured SAR value, at the distance $d_{be}$ from the boundary, and the analytical SAR value. |

The measured worst case boundary effect SARuncertainty[%] for scanning distances larger than 4mm is 1.0% (Limit ,2%).

### 3.5 PROBE MODULATION RESPONSE

MVG's probe were evaluated experimentally with various modulated signal and the deviation from CW response were found neglectable in the used power range of the probe. So the correction to taking into account the linearization parameters for different modulation is null, therefore the CW factor given in this report can be used whatever the measured modulation



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# 4 MEASUREMENT UNCERTAINTY

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty associated with a SAR probe calibration using the waveguide or calorimetric cell technique depending on the frequency.

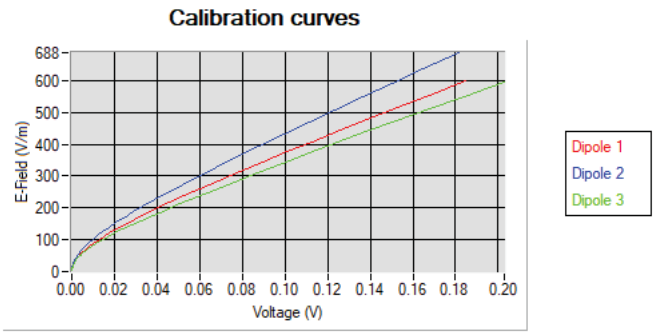
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-11% for the frequency range 150-450MHz.
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-14% for the frequency range 600-7500MHz.

# 5 CALIBRATION RESULTS

| Ambient condition | |
|---|---|
| Liquid Temperature | 20 +/- 1 °C |
| Lab Temperature | 20 +/- 1 °C |
| Lab Humidity | 30-70 % |

## 5.1 CALIBRATION IN AIR

The following curve represents the measurement in waveguide of the voltage picked up by the probe toward the E-field generated inside the waveguide.




From this curve, the sensitivity in air is calculated using the below formula.

$$E^2 = \sum_{i=1}^{3} \frac{V_i\left(1 + {V_i}/{DCP_i}\right)}{Norm_i}$$

where
Vi=voltage readings on the 3 channels of the probe
DCPi=diode compression point given below for the 3 channels of the probe
Normi=dipole sensitivity given below for the 3 channels of the probe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| Normx dipole 1 (µV/(V/m)$^2$) | Normy dipole 2 (µV/(V/m)$^2$) | Normz dipole 3 (µV/(V/m)$^2$) |
|---|---|---|
| 1.38 | 1.03 | 1.59 |

| DCP dipole 1 (mV) | DCP dipole 2 (mV) | DCP dipole 3 (mV) |
|---|---|---|
| 110 | 108 | 115 |

## 5.2 CALIBRATION IN LIQUID

The calorimeter cell or the waveguide is used to determine the calibration in liquid using the formula below.

$$ConvF = \frac{E_{liquid}^2}{E_{air}^2}$$

The E-field in the liquid is determined from the SAR measurement according to the below formula.

$$E_{liquid}^2 = \frac{\rho\, SAR}{\sigma}$$

where
σ=the conductivity of the liquid
ρ=the volumetric density of the liquid
SAR=the SAR measured from the formula that depends on the setup used. The SAR formulas are given below

For the calorimeter cell (150-450 MHz), the formula is:

$$SAR = c\frac{dT}{dt}$$

where
c=the specific heat for the liquid
dT/dt=the temperature rises over the time

For the waveguide setup (600-75000 MHz), the formula is:

$$SAR = \frac{4P_W}{ab\delta} e^{\frac{-2z}{\delta}}$$

where
a=the larger cross-sectional of the waveguide
b=the smaller cross-sectional of the waveguide
δ=the skin depth for the liquid in the waveguide
Pw=the power delivered to the liquid



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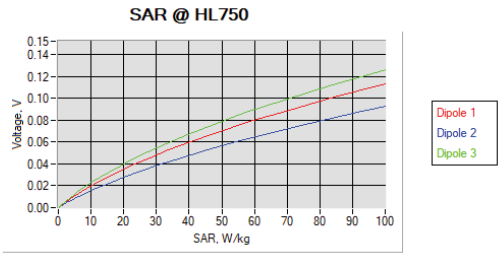
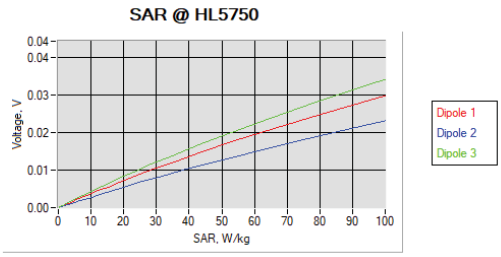
The below table summarize the ConvF for the calibrated liquid. The curves give examples for the measured SAR depending on the voltage in some liquid.

| Liquid | Frequency (MHz*) | ConvF |
|---|---|---|
| HL750 | 750 | 1.50 |
| HL835 | 835 | 1.45 |
| HL1800 | 1800 | 1.24 |
| HL2000 | 2000 | 1.63 |
| HL2100 | 2100 | 1.67 |
| HL2300 | 2300 | 1.20 |
| HL2450 | 2450 | 1.73 |
| HL2600 | 2600 | 1.65 |
| HL3300 | 3300 | 1.53 |
| HL3500 | 3500 | 1.40 |
| HL3700 | 3700 | 1.41 |
| HL3900 | 3900 | 1.44 |
| HL4200 | 4200 | 1.52 |
| HL5250 | 5250 | 1.56 |
| HL5600 | 5600 | 1.42 |
| HL5750 | 5750 | 1.46 |

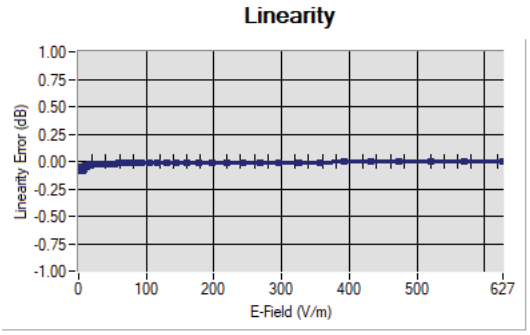
(*) Frequency validity is +/-50MHz below 600MHz, +/-100MHz from 600MHz to 6GHz and +/-700MHz above 6GHz



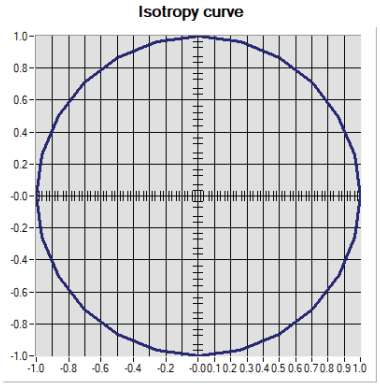




## 6 VERIFICATION RESULTS

The figures below represent the measured linearity and axial isotropy for this probe. The probe specification is +/-0.2 dB for linearity and +/-0.15 dB for axial isotropy.




Linearity:+/-1.99% (+/-0.09dB)




Isotropy:+/-0.13% (+/-0.01dB)



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# 7 LIST OF EQUIPMENT

| Equipment Summary Sheet | | | | |
|---|---|---|---|---|
| **Equipment Description** | **Manufacturer / Model** | **Identification No.** | **Current Calibration Date** | **Next Calibration Date** |
| CALIPROBE Test Bench | Version 2 | NA | Validated. No cal required. | Validated. No cal required. |
| Network Analyzer | Rohde & Schwarz ZND | 1328.5170K92-100497-kX | 12/2025 | 08/2028 |
| Network Analyzer – Calibration kit | Keysight 85052D | 85052D MY61410029 | 06/2024 | 06/2027 |
| Multimeter | Keithley 2000 | 4013982 | 02/2023 | 02/2027 |
| Signal Generator | Rohde & Schwarz SMB | 183277 | 05/2022 | 05/2027 |
| Amplifier | MVG | MODU-023-C-0002 | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Power Meter | NI-USB 5680 | 170100013 | 01/2026 | 01/2029 |
| USB Sensor | Keysight U2000A | SN: MY62340002 | 10/2024 | 10/2027 |
| Directional Coupler | Krytar 158020 | 131467 | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Fluoroptic Thermometer | LumaSense Luxtron 812 | 94264 | 09/2022 | 09/2026 |
| Coaxial cell | MVG | SN 32/16 COAXCELL_1 | Validated. No cal required. | Validated. No cal required. |
| Waveguide | MVG | SN 32/16 WG2_1 | Validated. No cal required. | Validated. No cal required. |
| Liquid transition | MVG | SN 32/16 WGLIQ_0G600_1 | Validated. No cal required. | Validated. No cal required. |
| Waveguide | MVG | SN 32/16 WG4_1 | Validated. No cal required. | Validated. No cal required. |
| Liquid transition | MVG | SN 32/16 WGLIQ_0G900_1 | Validated. No cal required. | Validated. No cal required. |
| Waveguide | MVG | SN 32/16 WG6_1 | Validated. No cal required. | Validated. No cal required. |
| Liquid transition | MVG | SN 32/16 WGLIQ_1G500_1 | Validated. No cal required. | Validated. No cal required. |
| Waveguide | MVG | SN 32/16 WG8_1 | Validated. No cal required. | Validated. No cal required. |
| Liquid transition | MVG | SN 32/16 WGLIQ_1G800B_1 | Validated. No cal required. | Validated. No cal required. |
| Liquid transition | MVG | SN 32/16 WGLIQ_1G800H_1 | Validated. No cal required. | Validated. No cal required. |



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| | | | | |
|---|---|---|---|---|
| Waveguide | MVG | SN 32/16 WG10_1 | Validated. No cal required. | Validated. No cal required. |
| Liquid transition | MVG | SN 32/16 WGLIQ_3G500_1 | Validated. No cal required. | Validated. No cal required. |
| Waveguide | MVG | SN 32/16 WG12_1 | Validated. No cal required. | Validated. No cal required. |
| Liquid transition | MVG | SN 32/16 WGLIQ_5G000_1 | Validated. No cal required. | Validated. No cal required. |
| Waveguide | MVG | SN 32/16 WG14_1 | Validated. No cal required. | Validated. No cal required. |
| Liquid transition | MVG | SN 32/16 WGLIQ_7G000_1 | Validated. No cal required. | Validated. No cal required. |
| Temperature / Humidity Sensor | Testo 184 H1 | 44235403 | 02/2024 | 02/2027 |



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CALIBRATION
CNAS L0570

Client Waltek Testing Group (Shenzhen) Co., Ltd.

**Certificate No: 25J02Z000765**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | SID2450 - SN: 13/15 DIP 2G450-364 |
| Calibration Procedure(s) | FF-Z11-0003-02<br>Calibration Procedures for dipole validation kits |
| Calibration date: | December 30, 2025 |

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22±3)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power Meter NRP2 | 106276 | 16-May-25 (CTTL, No. 25J02X003423) | May-26 |
| Power sensor NRP6A | 101369 | 16-May-25 (CTTL, No. 25J02X003423) | May-26 |
| Reference Probe EX3DV4 | SN 7464 | 28-Jan-25(SPEAG, No. EX-7464_Jan25) | Jan-26 |
| DAE4 | SN 1588 | 29-Aug-25(CTTL-SPEAG, No. 25J02Z000631) | Aug-26 |
| **Secondary Standards** | **ID #** | **Cal Date (Calibrated by, Certificate No.)** | **Scheduled Calibration** |
| SignalGeneratorSMA200A | 107732 | 01-Dec-25 (CTTL, No. 25J02X102467) | Nov-26 |
| NetworkAnalyzer E5071C | MY46110673 | 26-Nov-25 (CTTL, No. 25J02X102468) | Nov-26 |
| OCP DAK-3.5 | 1040 | 20-Jan-25(SPEAG, No. OCP-DAK3.5-1040_Jan25) | Jan-26 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Zhao Jing | SAR Test Engineer | |
| Reviewed by: | Lin Jun | SAR Test Engineer | |
| Approved by: | Qi Dianyuan | SAR Project Leader | |

Issued: December 31, 2025

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**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORMx,y,z |
| N/A | not applicable or not measured |

**Calibration is Performed According to the Following Standards:**

- IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- DASY System Handbook

**Methods Applied and Interpretation of Parameters:**

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

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## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY6 | V17.0.0 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Frequency** | 2450 MHz ± 1 MHz | |

## Head TSL parameters at 2450 MHz

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 39.2 | 1.80 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 39.5 ± 6 % | 1.81 mho/m ± 6 % |
| **Head TSL temperature change during test** | <1.0 °C | ---- | ---- |

## SAR result with Head TSL at 2450 MHz

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 20 dBm input power | 5.22 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **52.2 W/kg ± 20 % (*k*=2)** |
| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | Condition | |
| SAR measured | 20 dBm input power | 2.45 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **24.5 W/kg ± 20 % (*k*=2)** |

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## Appendix (Additional assessments outside the scope of CNAS L0570)

### Antenna Parameters with Head TSL at 2450 MHz

| | |
|---|---|
| Impedance, transformed to feed point | 44.9Ω+ 3.05jΩ |
| Return Loss | - 24.1dB |

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feed-point may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | MVG |

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**DASY6 Validation Report for Head TSL** Date: 2025-12-30

Test Laboratory: CTTL, Beijing, China

## Summary

| Dipole | Frequency [MHz] | TSL | Power [dBm] |
|---|---|---|---|
| SID2450 - SN: 13/15 DIP 2G450-364 | 2450 | HSL | 20 |

## Exposure Conditions

| Phantom Section, TSL | Position, Test Distance [mm] | Band Group, UID | Frequency [MHz] | Conversion Factor | TSL Cond. [S/m] | TSL Permittivity |
|---|---|---|---|---|---|---|
| Flat | 10 | CW, | 2450 | 6.89 | 1.81 | 39.5 |

## Hardware Setup

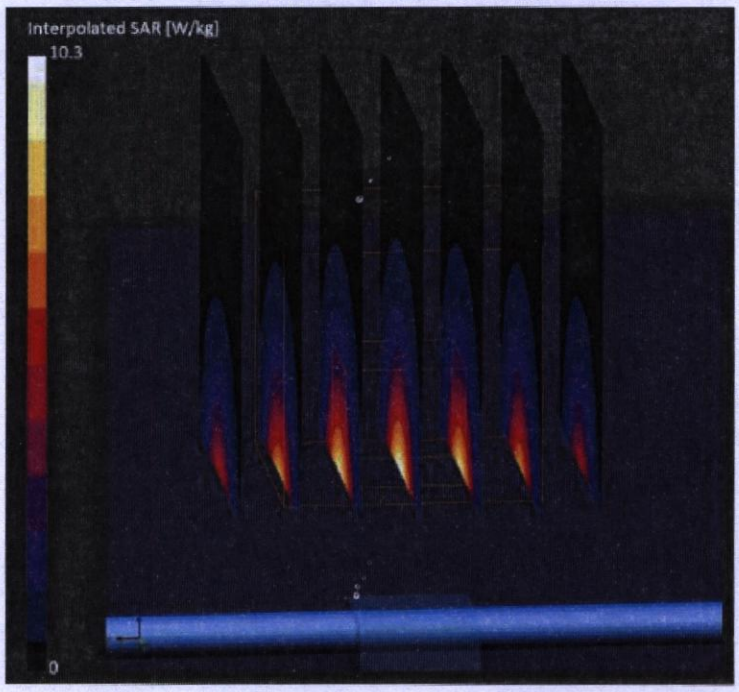
| Phantom | TSL | Probe, Calibration Date | DAE, Calibration Date |
|---|---|---|---|
| MFP V8.0 Right | 2450 Head, -- | EX3DV4 - SN7464, 2025-01-28 | DAE4 Sn1588, 2025-08-29 |

## Scan Setup

| | Zoom Scan |
|---|---|
| Grid Extents [mm] | 30.0×30.0×30.0 |
| Grid Steps [mm] | 5.0×5.0×1.5 |
| Sensor Surface [mm] | 1.4 |
| Graded Grid | Yes |
| Grading Ratio | 1.5 |
| MAIA | N/A |
| Surface Detection | VMS + 6p |
| Scan Method | Measured |

## Measurement Results

| | Zoom Scan |
|---|---|
| psSAR1g [W/kg] | 5.22 |
| psSAR10g [W/kg] | 2.45 |
| Power Drift [dB] | -0.00 |
| Power Scaling | Disabled |
| Scaling Factor [dB] | |
| TSL Correction | No correction |
| M2/M1 [%] | 82.3 |
| Dist 3dB Peak [mm] | 9.0 |



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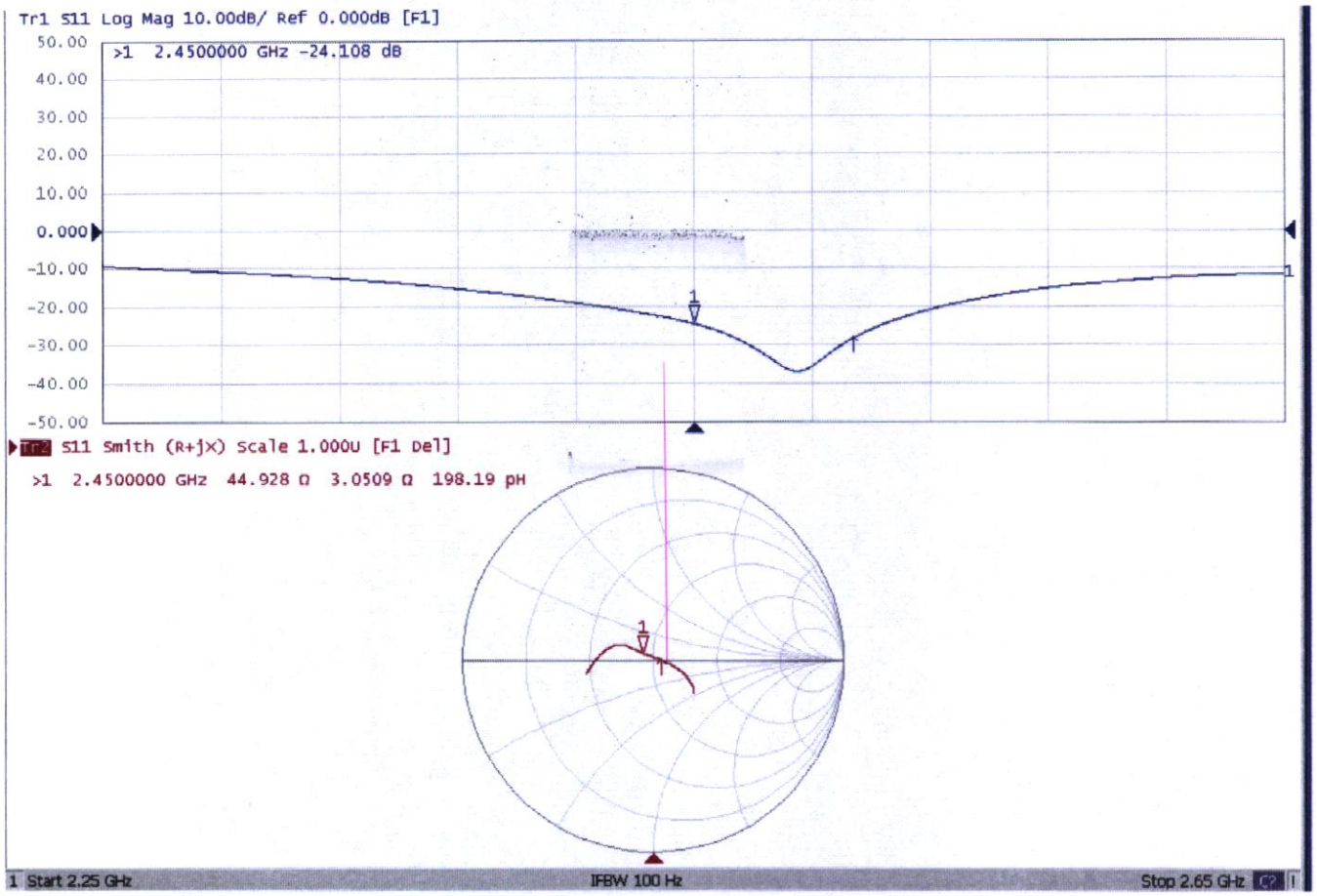
## Impedance Measurement Plot for Head TSL



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CALIBRATION
CNAS L0570

Client Waltek Testing Group (Shenzhen) Co., Ltd.

**Certificate No: 25J02Z000774**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | SID5000 - SN: 02/21 DIP 5G000-543 |
| Calibration Procedure(s) | FF-Z11-0003-02<br>Calibration Procedures for dipole validation kits |
| Calibration date: | October 23, 2025 |

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22±3)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power Meter NRP2 | 106276 | 16-May-25 (CTTL, No. 25J02X003423) | May-26 |
| Power sensor NRP6A | 101369 | 16-May-25 (CTTL, No. 25J02X003423) | May-26 |
| Reference Probe EX3DV4 | SN 7464 | 28-Jan-25(SPEAG, No. EX-7464_Jan25) | Jan-26 |
| DAE4 | SN 1588 | 29-Aug-25(CTTL-SPEAG, No. 25J02Z000631) | Aug-26 |
| **Secondary Standards** | **ID #** | **Cal Date (Calibrated by, Certificate No.)** | **Scheduled Calibration** |
| SignalGeneratorSMA200A | 107732 | 22-Jan-25 (CTTL, No. 25J02X000388) | Jan-26 |
| NetworkAnalyzer E5071C | MY46110673 | 18-Dec-24 (CTTL, No. 24J02X103932) | Dec-25 |
| OCP DAK-3.5 | 1040 | 20-Jan-25(SPEAG, No. OCP-DAK3.5-1040_Jan25) | Jan-26 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Zhao Jing | SAR Test Engineer | |
| Reviewed by: | Lin Jun | SAR Test Engineer | |
| Approved by: | Qi Dianyuan | SAR Project Leader | |

Issued: October 29, 2025

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORMx,y,z |
| N/A | not applicable or not measured |

**Calibration is Performed According to the Following Standards:**

- IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- DASY System Handbook

**Methods Applied and Interpretation of Parameters:**

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

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## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY6 | V17.0.0 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy = 4 mm, dz = 1.4 mm | Graded Ratio = 1.4 (Z direction) |
| **Frequency** | 5200 MHz ± 1 MHz<br>5400 MHz ± 1 MHz<br>5600 MHz ± 1 MHz<br>5800 MHz ± 1 MHz | |

## Head TSL parameters at 5200MHz

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 36.0 | 4.66 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 35.8 ± 6 % | 4.63 mho/m ± 6 % |
| **Head TSL temperature change during test** | <1.0 °C | ---- | ---- |

## SAR result with Head TSL at 5200MHz

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 100 mW input power | 7.62 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **76.1 W/kg ± 24 % (*k*=2)** |
| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | Condition | |
| SAR measured | 100 mW input power | 2.10 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **21.1 W/kg ± 24 % (*k*=2)** |

## Head TSL parameters at 5400MHz

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 35.8 | 4.86 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 35.5 ± 6 % | 4.85 mho/m ± 6 % |
| **Head TSL temperature change during test** | <1.0 °C | ---- | ---- |

## SAR result with Head TSL at 5400MHz

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 100 mW input power | 7.98 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **79.8 W/kg ± 24 % (*k*=2)** |
| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | Condition | |
| SAR measured | 100 mW input power | 2.21 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **22.2 W/kg ± 24 % (*k*=2)** |